

TRANSFER OF NATURAL RADIONUCLIDES FROM HAY AND SILAGE TO THE COW'S MILK IN THE VICINITY OF A FORMER URANIUM MINE

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After the closure of the former uranium mine Žirovski vrh in Slovenia, mining and milling wastes were deposited onto two waste piles, which are located close to the former uranium mine. These wastes contain elevated levels of natural radionuclides from uranium decay chain. Due to the different migration processes, these radionuclides can be transported through the grass into the cows and into the cow's milk. Because of that, nearby living people are concerned about potential radiation effects on their health. Therefore it is essential to know, how these radionuclides are concentrated in cow's milk. Transfer of artificial radionuclides in the cow's milk, especially ^{90}Sr and ^{137}Cs , was widely studied in the past. However, there is lack of data on the transfer of natural radionuclides to the cow's milk. In the present study, transfer of critical natural radionuclides was investigated in the above-mentioned food chain. Therefore, soil, hay, silage and milk samples were collected on the farm, which lays close to the former uranium mine. In these samples, natural radionuclides ^{238}U , ^{234}U , ^{232}Th , ^{230}Th , ^{226}Ra , ^{210}Pb and ^{210}Po were determined using radiochemical separation methods and alpha spectrometry or proportional counter measurement system. Results for the activity concentrations in dry hay and silage samples were 0.216 Bq/kg for ^{238}U , 0.264 Bq/kg for ^{234}U , 0.130 Bq/kg for ^{232}Th , 0.343 Bq/kg for ^{230}Th , 0.938 Bq/kg for ^{226}Ra , 14.5 Bq/kg for ^{210}Pb and 13.6 Bq/kg for ^{210}Po . Activity concentrations in fresh milk samples were 7.10E-3 Bq/kg for ^{238}U , 7.87E-3 Bq/kg for ^{234}U , 6.68E-3 Bq/kg for ^{232}Th , 3.15E-3 Bq/kg for ^{230}Th , 8.33E-3 Bq/kg for ^{226}Ra , 3.81E-2 Bq/kg for ^{210}Pb and 3.17E-2 Bq/kg for ^{210}Po . In addition, hay and silage to milk concentration ratios were calculated and were 3.29E-2 for ^{238}U , 5.12E-2 for ^{232}Th , 9.18E-2 for ^{230}Th , 8.88E-3 for ^{226}Ra , 2.62E-3 for ^{210}Pb and 2.34E-3 for ^{210}Po . Calculated annual ingestion dose due to milk consumption for adults for critical natural radionuclides was 9.2 μSv .